Climate Change Report

This proposed action would affect approximately 7,880 acres of forest by thinning smaller trees from the stand using a variety of methods (e.g., harvesting overstory trees, reducing surface fuels through prescribed fire, or thinning treatments in combination with prescribed fire), retaining a residual stand of about 75 percent of the original stand by basal area. This scope and degree of change would be minor, affecting roughly 2 percent of the 1.1 million acres of forested land in the Colville National Forest. In addition, the effect of the proposed action focuses on aboveground carbon stocks, which typically comprise a fraction of the total ecosystem carbon stocks in the proposed managed area; 50 percent or more of the ecosystem carbon is in the soils, a very stable and long-lived carbon pool (McKinley et al. 2011, Domke et al. 2017).

Climate change is a global phenomenon, because major greenhouse gasses (GHGs)[1] mix well throughout the planet's lower atmosphere (IPCC 2013). Considering emissions of GHGs in 2010 were estimated at 49 ± 4.5 gigatonnes[2] carbon dioxide (CO2) equivalent[3] globally (IPCC 2014) and 6.9 gigatonnes CO2 equivalent nationally (US EPA 2015), a project of this size makes an extremely small contribution to overall emissions. Because local GHGs emissions mix readily into the global pool of GHGs, it is difficult and highly uncertain to ascertain the indirect effects of emissions from single or multiple projects of this size on global climate. Therefore, at the global and national scales, this proposed action's direct and indirect contribution to GHGs and climate change would be negligible. In addition, because the direct and indirect effects would be negligible, the proposed action's contribution to cumulative effects on global GHGs and climate change would also be negligible. Lastly, carbon emissions during the implementation of the proposed action would have only a momentary influence on atmospheric carbon concentrations, because carbon will be removed from the atmosphere with time as the forest regrows, further minimizing or mitigating any potential cumulative effects.

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) summarized the contributions of global human activity sectors to climate change (IPCC 2014). From 2000 to 2009, forestry and other land uses contributed just 12 percent of the human-caused global CO2 emissions[4]. The forestry sector's contribution to GHG emissions has declined over the last decade (IPCC 2014, Smith et al. 2014, FAOSTAT 2013). The largest source of GHG emissions in the forestry sector globally is deforestation (Pan et al. 2011, Houghton et al. 2012, IPCC 2014), which is defined as the removal of all trees to convert forested land to other land uses that do not support trees or allow trees to regrow for an indefinite period of time (IPCC 2000) (e.g., conversion of forest land to agricultural or developed landscapes).

This vegetation management project is not considered a major source of GHG emissions. Forested land will not be converted into a developed or agricultural condition or otherwise result in the loss of forested area. In fact, forest stands are being retained and thinned and prescribed burned to maintain a vigorous

[1] Major greenhouse gases released as a result of human activity include carbon dioxide (CO2), methane, nitrous oxide, hydrofluorocarbons, and perfluorocarbons
[2] Gigatonne is one billion metric tons; equal to about 2.2 trillion pounds
[3] Equivalent CO2 (CO2e) is the concentration of CO2 that would cause the same level of radiative forcing as a given type and concentration of greenhouse gas. Examples of such greenhouse gases are methane, perfluorocarbons, and nitrous oxide
[4] Fluxes from forestry and other land use (FOLU) activities are dominated by CO2 emissions. Non-CO2 greenhouse gas emissions from FOLU are small and mostly due to peat degradation releasing methane and were not included in this estimate

condition that supports enhanced tree growth and productivity, thus contributing to long-term carbon uptake and storage. In 2010, forests in the United States removed about 757 megatonnes[5] of CO2 from the atmosphere after accounting for natural emissions (e.g., wildfire and decomposition) (US EPA 2015).

Some assessments suggest that the effects of climate change in some United States forests may cause shifts in forest composition and productivity or prevent forests from fully recovering after severe disturbance (Anderson-Teixeira et al. 2013), thus impeding their ability to take up and store carbon[6] and retain other ecosystem functions and services. Climate change is likely already increasing the frequency and extent of droughts, fires, and insect outbreaks, which can influence forest carbon cycling (Kurz et al. 2009, Allen et al. 2010, Joyce et al. 2014). In fact, reducing stand density, one of the goals of this proposed action, is consistent with adaptation practices to increase resilience of forests to climate-related environmental changes (Joyce et al. 2014). This proposed action is consistent with options proposed by the IPCC for minimizing the impacts of climate change on forests, thus meeting objectives for both adapting to climate change and mitigating GHG emissions (McKinley et al. 2011).

Forests have a “boom and bust” cycle with respect to carbon, as forests establish and grow, experience mortality with age or disturbances, and regrow over time. Forest management activities such as harvests and hazardous fuels reduction have characteristics similar to disturbances that reduce stand density and promote regrowth through thinning and removal, making stands and carbon stores more resilient to environmental change (McKinley et al. 2011). The relatively small quantity of carbon released to the atmosphere and the short-term nature of the effect of the proposed action on the forest ecosystem are justified, given the overall change in condition increases the resistance to wildfire, drought, insects and disease, or a combination of disturbance types that can reduce carbon storage and alter ecosystem functions (Millar et al. 2007, Amato et al. 2011). Furthermore, any initial carbon emissions from this proposed action will be balanced and possibly eliminated as the stand recovers and regenerates, because the remaining trees and newly established trees typically have higher rates of growth and carbon storage (Hurteau and North 2009, Dwyer et al. 2010, McKinley et al. 2011).

In the absence of commercial thinning, the forest where this proposed action would take place will thin naturally from mortality-inducing natural disturbances and other processes resulting in dead trees that will decay over time, emitting carbon to the atmosphere. Conversely, the wood and fiber removed from the forest in this proposed action will be transferred to the wood products sector for a variety of uses, each of which has different effects on carbon (Skog et al. 2014). Carbon can be stored in wood products for a variable length of time, depending on the commodity produced. It can also be burned to produce heat or electrical energy, or converted to liquid transportation fuels and chemicals that would otherwise come from fossil fuels. In addition, a substitution effect occurs when wood products are used in place of other products that emit more GHGs in manufacturing, such as concrete and steel (Gustavasson et al. 2006, Lippke et al. 2011, McKinley et al. 2011). In fact, removing carbon from forests for human use can result in a lower net contribution of GHGs to the atmosphere than if the forest were not managed (McKinley et al. 2011, Bergman et al. 2014, Skog et al. 2014). The IPCC recognizes wood and fiber as a renewable resource that can provide lasting climate-related mitigation benefits that can increase over time with active management (IPCC 2000). Furthermore, by reducing stand density, the proposed action may also reduce the risk of more severe disturbances, such as insect and disease outbreak and severe wildfires, which may result in lower forest carbon stocks and greater GHG emissions.

[5] A megatonne is one million metric tons; equal to about 2.2 billion pounds
[6] The term “carbon” is used in this context to refer to carbon dioxide

In the absence of prescribed fire to reduce stand density and fuel loads, the fire-adapted forest where this proposed action would take place may be more at risk to a high-severity wildfire, resulting in decreased ecosystem services and potentially increased carbon emissions. Prescribed fires typically target surface and ladder fuels and are typically less severe than wildfires (Agee and Skinner 2005), because they are conducted only when weather conditions are optimal and fuel moisture is high enough to keep combustion and spread within predetermined limits. Thus, prescribed fires result in minimal overstory tree mortality and typically combust less than 50 percent of the available fuel (Carter and Foster 2004, Hurteau and North 2009), producing lower GHG emissions than might be emitted if the same area were to burn in a high-severity wildfire (Wiedinmyer and Hurteau 2010). Also, a large portion of the emissions associated with prescribed fires is from duff, litter, and dead wood which comprise carbon pools that would otherwise decay quickly over time, releasing carbon to the atmosphere. Hazardous fuels reduction and restoration treatments can help reduce the severity of wildfires in forests where fire exclusion has resulted in high fuel loadings and high tree densities (Agee and Skinner 2005, Stephens et al. 2013).

High-severity fires, especially when they occur repeatedly, can affect human health and safety, infrastructure, and ecosystem services, and can cause a transition of forests to non-forest ecosystems in some areas (Roccaforte et al. 2012, Anderson-Teixeira et al. 2013). By reducing the threat of high-severity wildfire, the proposed action would create conditions more advantageous for supporting forest health in a changing climate and reducing GHG emissions over the long term.

In summary, this proposed action affects a relatively small amount of forest land and carbon on the Colville National Forest and, in the near term, might contribute an extremely small quantity of GHG emissions relative to national and global emissions. This proposed action will not convert forest land to other non-forest uses, thus allowing any carbon initially emitted from the proposed action to have a temporary influence on atmospheric GHG concentrations, because carbon will be removed from the atmosphere over time as the forest regrows or will transfer carbon to the product sector where it may be stored for decades and substitute for more emission intensive materials or fuels. This proposed action is consistent with internationally recognized climate change adaptation and mitigation practices.

References

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